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GROUPING OF THE VOLGA AND THE ILOVLYA WATERSHED SOILS ACCORDING TO FOREST-GROWING QUALITIES

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The historical decree of the Council of Ministers USSR and TsK VKP(b), of 20 October 1948, concerning the planting of shelter belts, introduction of the grass-crop rotation system, and construction of ponds and reservoirs for the purpose of assuring large and uniform crops in the steppe and forest-steppe regions of European USSR raises a whole new series of problems for soil scientists.

The greatest Russian scientists, V. V. Dokuchayev, P. A. Kostychev, and V. R. Williams, played a prominent role in formulating, developing, and crystallizing agricultural measures for the struggle against drought.

The doctrine of the grass-crop system of agriculture, developed by Williams, has become a state measure. This doctrine embraces the three main subdivisions of agriculture: forest, meadow, and field cultivation. One of the basic tenets of the doctrine of the grass-crop system of agriculture is Williams' proposition that "the forest controls the water supply of the country."

The state shelter belt which is to be between Kamyshin and Stalingrad will be located in the dry steppe zone along the watershed of the Volga and the Ilovlya rivers.

The study made of forest-growing qualities of the area to be occupied by this state shelter belt has taken into consideration the studies of chestnut soils made by Academicians L. I. Prasolov and V. P. Bushinskiy and Associate Members of the Academy of Sciences USSR I. P. Gerasimov, N. A. Kachinskiy, I. N. Antipov-Karatayev, L. I. Iozefovich, S. I. Nikitin, G. M. Tumin, and N. A. Dimo. Forest-growing qualities of the territory were reflected in the works of G. N. Vysotskiy, N. I. Sus, and N. N. Stepanov. Ground cover studies made by I. V. Novopokrovskiy, Ye. M. Lavrenko, and B. A. Keller were also examined.

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The area to be occupied by the Kamyshin-Stalingrad shelter belt has a very dry climate, which has a negative influence on the growth and development of vegetation. The water supply of the territory is unstable and unfavorable, resulting in small harvests of agricultural crops.

The area between the Volga and the Ilovlya rivers represents the southern extremity of the Volga Heights with elevations of 150-230 meters along the watershed. The watershed exhibits a distinctly asymmetrical structure. The northern and central parts of the route are covered with fescue-(Festuca sulcata) wormwood (Artemisia) formations (in spots, feather grass (Stipa) fescue-wormwood formations), to which white and black wormwood formations are added in the south.

The dearth of grass cover, the weakness of its development, the presence of steppe vegetation, and the extreme dryness of the climate result, as Williams has pointed out, in an aerobic decomposition of organic matter in the soil. As a result of this combination of soil-forming conditions, a type of chestnut soil has developed.

A total of 35 soil varieties were differentiated in studying the route of the state shelter belt. To plan the species of trees to be planted and the agricultural measures to be taken, these varieties were divided into eight groups.

In 1936, soils grouped according to their forest-growing qualities was published for the territory at Stalingrad where subsequently a shelter belt was planted around the city. The following elements determined the present grouping: soil subtype, degree of solonization, texture, and solonets content in complex.

	Texture
Group I	
Dark chestnut soils	
Dark-colored gully (meadow chestnut) soils With reduced fermentation (s poni zhennym vskipaniyem) Slightly solonized	Moderate clayey loam and light clayey loam
Turfy alluvial ravine soils With reduced fermentation Slightly solonized	
Slightly solonized dark chestnut soils	
Slightly solonized chestnut soils	
Dark chestnut, chestnut, slightly solonized, dark chestnut, and slightly solonized chestnut soils, with up to 10 percent solonets content in complex	
Group II	
Dark chestnut soils	
Dark-colored gully soils with reduced fermentation (meadow chestnut soils with reduced fermentation)	Sandy loam and sandy
Turfy alluvial ravine soils with reduced fermentation	
Chestnut soils	
Slightly solonized dark chestnut soils	Sandy loam
Slightly solonized chestnut soils	Sandy loam

	Texture
Group III	
Dark chestnut soils Dark-colored gully (meadow chestnut) soils With reduced fermentation Slightly solonized Turfy alluvial ravine soils With reduced fermentation Slightly solonized Chestnut soils Slightly solonized dark chestnut soils Slightly solonized chestnut soils Dark chestnut, chestnut, slightly solonized dark chestnut, and slightly solonized chestnut soils, with up to 10 percent solonets content in complex	Heavy clayey loam and Clayey
Group IV	
Dark-colored gully soils of carbonated dark chestnut and chestnut types; moderately solonized dark chestnut and chestnut types (carbonated meadow chestnut and moderately solonized soils) Dark chestnut and chestnut thin alluvial soils Carbonated dark chestnut and chestnut soils Light chestnut, slightly solonized light chestnut, and carbonated light chestnut soils, with up to 10 percent solonets content in complex Slightly solonized dark chestnut and chestnut soils, with 10-25 percent solonets content in complex Moderately solonized dark chestnut and chestnut soils with up to 10 percent solonets content in complex	Moderate clayey loam and light clayey loam
Group V	
Dark-colored gully soils of carbonated dark chestnut and chestnut type and moderately solonized dark chestnut and chestnut type (carbonated and moderately solonized meadow chestnut soils) Carbonated dark chestnut and chestnut soils Light chestnut, slightly solonized light chestnut, and carbonated light chestnut soils, with up to 10 percent solonets content in complex Slightly solonized dark chestnut and chestnut soils, with 10-25 percent solonets content in complex Moderately solonized dark chestnut and chestnut with up to 10 percent solonets content in complex	Heavy clayey loam and clayey

	Texture
Group VI	
Moderately solonized dark chestnut and chestnut soils, containing in complex: 10-25 percent solonets, 25-50 percent dark-colored gully soils	
Slightly and moderately solonized light chestnut soils, containing in complex: 10-25 percent solonets, 25-50 percent dark-colored gully soils	
Moderately solonized dark chestnut and chestnut soils, containing in complex: 10-25 percent solonets, up to 25 percent dark-colored gully soils	Moderate clayey loam and light clayey loam
Slightly and moderately solonized light chestnut soils, containing in complex: 10-25 percent solonets, up to 25 percent dark-colored gully soils	
Group VII	
Moderately solonized dark chestnut and chestnut soils, containing in complex: 10-25 percent solonets, 25-50 percent dark-colored gully soils	
Slightly and moderately solonized light chestnut soils, containing in complex: 10-25 percent solonets, 25-50 percent dark-colored gully soils.	
Moderately solonized dark-chestnut and chestnut soils, containing in complex: 10-25 percent solonets, up to 25 percent dark-colored gully soils	
Slightly and moderately solonized light chestnut soils, containing in complex: 10-25 percent solonets, up to 25 percent dark-colored gully soils	Heavy clayey loam and clayey
Dark chestnut, chestnut, and moderately solonized light chestnut soils, containing 25-50 percent solonets in complex	Moderate clayey loam and light clayey loam
Group VIII	
Dark chestnut, chestnut, and moderately solonized light chestnut soils, containing 25-50 percent solonets in complex	Clayey and heavy clayey loam
Dark chestnut, chestnut, and strongly solonized light chestnut soils, containing solonets in complex	
Excavated soils (suslik /small, earth-burrowing animals/ mounds)	Varying mechanical composition
Steppe solonets soils	

Available data prove that soils of the dry steppe zone are characterized by varying forest-growing qualities. The proposed grouping is an attempt to divide soil varieties into a few groups, each of which displays comparatively similar forest-growing qualities. It is now known whether forest-growing qualities vary not only according to soil types and subtypes but also according to varieties and variants. Forest-growing qualities deteriorate as transition is made from dark chestnut to light chestnut soils, from slightly solonized to strongly solonized soils. They also deteriorate as

the amount of solonets increases and dark-colored gully soils decrease in complex. Moderate clayey loam and light clayey loam soils are the most favorable as to texture for the majority of tree species. Sandy loam and sandy soils are next in importance. Least favorable are heavy clayey loam and clayey soils since, according to N. A. Kachinskiy, they have negative physical qualities.

The grouping of soils as indicated above proceeds from those groups having the most favorable forest-growing qualities to those having the least favorable.

The first group includes all dark-colored gully (meadow chestnut) soils, dark chestnut and chestnut soils, and slightly solonized varieties, but also all of the foregoing when they contain up to 10 percent steppe solonets. All soils of this group have a moderate clayey loam or light clayey loam texture. This group is characterized by the most favorable chemical and physical qualities of dry stepppe zone soils. The forest-growing qualities of this group are the very best in this zone.

The second group contains all those soils which have a sandy loam and sandy texture. Forest-growing qualities are favorable for certain tree species such as pine.

The third group contains the first-group soils which have a heavy clayey loam and clayey texture. Since physical qualities of these soils are not as good as those of Groups I and II, forest-growing qualities are likewise not as good but are comparatively favorable nevertheless.

The fourth group includes carbonated, thin varieties of dark chestnut and chestnut soils, light chestnut soils, and slightly solonized and carbonated varieties containing up to 10 percent solonets in complex. Moderately solonized dark chestnut and chestnut soils containing up to 10 percent solonets in complex and slightly solonized soils containing 10-25 percent solonets in complex also belong to this group. The soils of this group have a moderate to light clayey loam texture.

The fifth group includes the soils of Group IV except that they have a heavy clayey loam and clayey texture.

The sixth group includes moderately solonized dark chestnut and chestnut soils containing 10-25 percent solonets in complex, as well as light chestnut soils containing 10-25 percent solonets in complex. This group subdivides into two subgroups: (a) with a 25-50 percent dark-colored gully soil content; (b) with a dark-colored gully soil content up to 25 percent.

The seventh group contains Group VI soils which have a heavy clayey loam and clayey texture. This group is characterized by less favorable forest-growing qualities than the foregoing ones. The unfavorable conditions are explained by the heavy texture of the groups but especially by the greater degree of solonization and greater solonets content in complex.

The eighth group includes moderately solonized varieties containing 25-50 percent solonets in complex and having a heavy clayey loam and clayey texture. Strongly solonized soils, excavated (suslik mounds) soils, and typical steppe solonets soils of varying texture also belong to this group. As a result of the unfavorable physical and chemical qualities of these soils, their gorest-growing qualities are negative. To grow trees on them successfully, these soils must first be improved.

In Groups I, III, and IV, the meadow chestnut and turfy alluvial soils have the best forest-growing qualities as compared with the other soils of these groups.

At present, this grouping of soils according to their forest-growing qualities is being worked out in greater detail and on a broader base.

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